

## 1 Introduction

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The Barellan Flood Study has been prepared for Narrandera Shire Council (Council) to define the existing flood behaviour in the catchment and establish the basis for subsequent floodplain management activities. The assessment of these potential activities is then provided within the accompanying Floodplain Risk Management Study, with recommended actions detailed in the Plan.

During the March 2012 flood event the community of Barellan was inundated with flood water emanating from a break-out of Mirrool Creek to the south-east of the town across Mirrool Road, near Moomboodool. Flood water in the town remained elevated for many days.

Detailed investigation into flooding at Barellan has not previously been completed. To date, the Guidelines for Mirrool Creek Floodplain Development Barellan to Yenda (Water Resources Commission, 1978) provides the best estimate of flood behaviour at Barellan. Following from the March 2012 event, BMT WBM was commissioned by Narrandera Shire Council in 2015 to complete the Barellan Flood Study and the consequent Floodplain Risk Management Study and Plan.

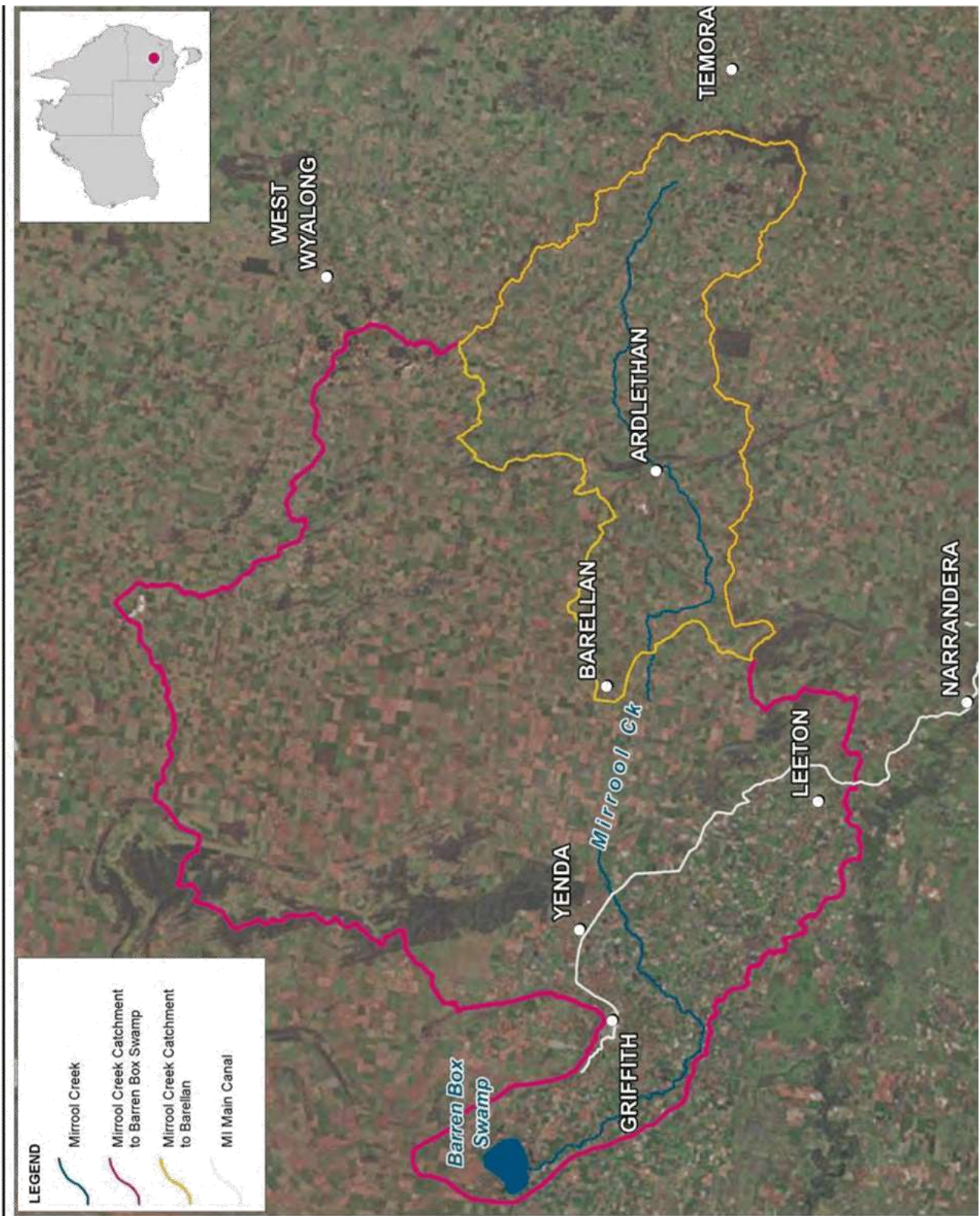
### 1.1 Study Location

Barellan is located in the Riverina region of south-west NSW. The closest city is Griffith located approximately 50 km to the west. The town of Ardlethan lies some 30 km to the east. The Mirrool Creek floodplain, south of Barellan, is wide and flat, with typical field grades of approximately 0.1%.

### 1.2 Study Background

Major floods have occurred within the region throughout history. A number of floods have been experienced in the study catchment since European settlement and the construction of the downstream irrigation system in 1912. Major floods are known to have occurred in 1928, 1931, 1939, 1956, 1974, 1984, 1989, and most recently in 2012. Of these flood events only the recent March 2012 event resulted in flooding to Barellan township.

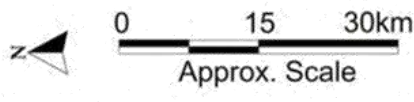
Prior to March 2012, historic flood events have impacted on a number of settlements within the catchment. The January 1984 event was the largest event in recorded history at the upper catchment localities of Ardlethan and Beckom. The series of flood events in March and April 1989 generated a substantial volume of catchment runoff, which caused problems at Barren Box Swamp and landholders downstream. However, the March 2012 flood event was typically the largest, or one of the largest, events in recorded history for most locations throughout the Mirrool Creek catchment. The unprecedented flooding to the Barellan township during March 2012 highlighted the need to understand and manage the flood risk to which the town is exposed, as no previous studies specific to the Barellan township have been undertaken to date.



Title:  
**Study Locality**

Figure: <b>1-1</b>	Rev: <b>A</b>
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BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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### 1.3 The Need for Floodplain Risk Management in Barellan

As evidenced in the March 2012 flood event, there are a substantial number of properties within the community of Barellan (over 100 properties) at risk of flooding from both local catchment runoff and Mirrool Creek flooding. Appropriate floodplain risk management activities need to be identified in order to reduce the flood risk that the community is exposed to.

Floodplain risk management considers the consequences of flooding on the community and aims to develop appropriate floodplain risk management measures to minimise and mitigate the impact of flooding. This incorporates the existing flood risk associated with current development, and future flood risk associated with future development and changes in land use.

Accordingly, Council desires to approach local floodplain risk management in a considered and systematic manner. This study comprises the initial stages of that systematic approach, as outlined in the Floodplain Development Manual (NSW Government, 2005). The approach will allow for more informed planning decisions within the Barellan township and the broader Mirrool Creek catchment.

### 1.4 The Floodplain Risk Management Process

The State Government’s Flood Prone Land Policy is directed towards providing solutions to existing flooding problems in developed areas and ensuring that new development is compatible with the flood hazard and does not create additional flooding problems in other areas. Policy and practice are defined in the Government’s Floodplain Development Manual (2005).

Under the Policy the management of flood liable land remains the responsibility of Local Government being the consenting authority. The State Government subsidises flood mitigation works to alleviate existing problems and provides specialist technical advice to assist Councils in the discharge of their floodplain risk management responsibilities.

The Policy provides for technical and financial support by the State Government through the following four sequential stages:

**Table 1-1 Stages of Floodplain Risk Management**

	Stage	Description
1	Formation of a Committee	Established by Council and includes community group representatives and State agency specialists.
2	Data Collection	Past data such as flood levels, rainfall records, land use, soil types etc.
3	<b>Flood Study</b>	<b>Determines the nature and extent of the flood problem.</b>
4	Floodplain Risk Management Study	Evaluates management options for the floodplain in respect of both existing and proposed developments.
5	Floodplain Risk Management Plan	Involves formal adoption by Council of a plan of risk management for the floodplain.

	Stage	Description
6	Implementation of the Floodplain Risk Management Plan	Construction of flood mitigation works to protect existing development. Use of environmental plans to ensure new development is compatible with the flood hazard. Provision of flood intelligence to assist SES with emergency management planning within the catchment.

This study represents Stages 3 of the above process. It aims to provide an understanding of flood behaviour in the Mirrool Creek catchment and the implications for flood risk in Barellan.

### 1.5 Study Objectives

The primary objective of the Flood Study is to define the flood behaviour within the Mirrool Creek catchment, with a particular focus on Barellan, through the establishment of appropriate numerical models. The study has produced information on flood flows, velocities, levels and extents for a range of flood event magnitudes under existing catchment and floodplain conditions. Specifically, the study incorporates:

- Compilation and review of existing information pertinent to the study and acquisition of additional data including survey as required;
- Undertaking a community consultation and participation program to identify local flooding concerns, collect information on historical flood behaviour and engage the community in the on-going floodplain risk management process;
- Development and calibration of appropriate hydrologic and hydraulic models;
- Determination of design flood conditions for a range of design events including the 20% Annual Exceedance Probability (AEP), 10% AEP, 5% AEP, 2% AEP, 1% AEP, 0.5% AEP and extreme flood event;
- Hydraulic and provisional hazard categorisation of the floodplain to guide future floodplain management;
- Presentation of study methodology, results and findings in a comprehensive report incorporating appropriate flood mapping; and
- Identification of key locations for consideration during the floodplain risk management process.

The principal outcome of the flood study is the understanding of flood behaviour in the catchment and in particular design flood information that will underpin the floodplain risk management activities. The Barellan Floodplain Risk Management Study and Plan is to be completed concurrently with this study.

### 1.6 About this Report

This report documents the Study's objectives, results and recommendations.

Section 1 introduces the study.

Section 2 provides an overview of the approach adopted to complete the study.

Section 3 outlines the community consultation program undertaken.

Section 4 provides an overview of the regional flood behaviour.

Section 5 details the development of the computer models.

Section 6 details the model calibration and validation process.

Section 7 details the adopted design flood conditions.

Section 8 presents the design flood conditions, modelling uncertainties and a flood damages assessment.